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OJ287 taken to pieces: The origin of a precessing and rotating jet

Aller M., Aller H., Eckart A., Nilsson K., Arévalo P., Cuadra J., Witzel A.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© Published under licence by IOP Publishing Ltd. OJ287 is the best candidate active galactic nucleus for hosting a supermassive binary black hole at very close separation, corresponding to the orbital period of the order of ~9 yr. We studied the pc-scale jet dynamics in 118 Very Long Baseline Array (VLBA) observations at 15 GHz covering the time between Apr. 1995 and Jan. 2017. To our knowledge, this is the first time, that the kinematics of the Blandford-Znajek jet (originating in the ergosphere of a rotating black hole) and jet sheath (originating from the accretion disk) are seen and traced in observations. We also find that the OJ287 radio jet is rotating and precessing. The jet dynamics as well as the flux-density light curves can be understood in terms of geometrical effects. A binary black hole model can explain the time scale of the precessing motion. Lense-Thirring precession of an accretion disc surrounding a single black hole is consistent with the time scale as well.

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